

# JAPAN

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JIS B 6514 (1989) (English): Test methods for performance and accuracy of hollow chisel mortising machines

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*The citizens of a nation must  
honor the laws of the land.*

Fukuzawa Yukichi

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# JIS

**JAPANESE INDUSTRIAL STANDARD**

**Test Methods for Performance  
and Accuracy of Hollow  
Chisel Mortising Machines**

**JIS B 6514—1989**

**Translated and Published**

**by**

**Japanese Standards Association**

In the event of any doubt arising,  
the original Standard in Japanese is to be final authority.

## JAPANESE INDUSTRIAL STANDARD

J I S

Test Methods for Performance and Accuracy  
of Hollow Chisel Mortising Machines

B 6514-1989

**1. Scope**

This Japanese Industrial Standard specifies the methods of testing the functions, running performances and rigidities and the methods of inspecting the static accuracies and machining accuracy of the hollow chisel mortising machines 6 mm or over up to and including 30 mm in the hollow chisel size specified in No. 6521 of JIS B 0114.

Remark: The units and numerical values given in { } in this Standard are based on the traditional units and are appended for informative reference.

**2. Methods for Functional Tests**

The functional tests of the hollow chisel mortising machines shall be as specified in Table 1.

Table 1. Functional Tests

No.	Test item	Test method
1	Electric equipment	Before and after the running test, examine the insulating condition once each.
2	Start, stop and running operation of main spindle	At an appropriate main spindle speed, carry out 10 continuous operations of start and stop to examine the smoothness and reliability of actions.
3	Changing operation of main spindle speed of rotation	Change the main spindle speed of rotation throughout overall marked speeds of rotation to examine the smoothness of the actions and the reliability of the indication of the operating device.
4	Changing operation of feed speed	Change the speeds over the entire marked feed speeds to examine the smoothness of actions and the reliability of indication of the operating device.
5	Manual feed operation	Examine the smoothness and uniformity of actions throughout the overall length of the motion by working the manual feed handle, and also rotate the sensitive feed handle several times to examine the smoothness and uniformity.
6	Operations of ascending and descending and clamping of main spindle head and operation of automatic stop	Allow the main spindle head to ascend and descend to examine the smoothness and uniformity of actions throughout the overall length of motions, and examine the reliability of clamping and smoothness of actions of clamping device at both ends and center of motion. In addition, examine, at both ends of motion, the smoothness and reliability of actions of the automatic stopping device.

Applicable Standards and Reference Standards: See page 9.

Table 1 (Cont'd)

No.	Test item	Test method
7	Ascending and descending and clamping operation of table	Allow the table to ascend and descend to examine the smoothness and uniformity of actions throughout the overall length of motions. In addition, examine at both ends and center of motions the reliability and the smoothness of the action of the clamping device.
8	Attaching and detaching of hollow chisel	Examine the reliability and smoothness of attaching and detaching the hollow chisel and the clamping screw.
9	Attaching and detaching of workpiece	Examine the reliability and smoothness of attaching and detaching the workpiece and the clamping screw.
10	Safety device	Examine the reliability of safety functions for the operator and the protective functions for machines [see JIS B 6507].
11	Lubricating device	Examine the reliability of such functions and the oil-tightness and proper distribution of the quantity of oil.
12	Oil hydraulic pressure device	Examine the reliability of such functions as the oil-tightness and pressure regulation.
13	Pneumatic pressure device	Examine the reliability of such functions as the airtightness and pressure regulation.
14	Accessories	Examine the reliability of the functions.

Remark: For a hollow chisel mortising machine which is not provided with the functions concerned, the test items corresponding to them in Table 1 are to be omitted.

### 3. Methods for Running Tests

**3.1 No-Load Running Test** Allow the main spindle to rotate, continue running for 30 to 60 min, measure the required electric power and noise after bearing temperatures have been stabilized, keep records of each item specified in the Record Format 1 of Table 2, and confirm, by the sense of touch, that no abnormal vibration exists.

Further, the measurement of noise shall be as specified in JIS B 6521.

Table 2. Record Format 1

No.	Measured time O'clock, minute	Main spindle speed of rotation min <sup>-1</sup> {rpm}		Temperature °C			Required electricity			Noise dB (A)	Description
				Main spindle bearing		Room temper- ature	Voltage V	Current A	Input kW		
		Marking	Actual measure- ment	Upper	Lower						

Remarks 1. For a machine provided with a speed change device for the main spindle speed of rotation, records shall be taken of the speeds of rotation at 2 or more levels including the maximum speed of rotation.

2. The measuring conditions of noise shall be recorded in the description column.

**3.2 Load Running Test** Carry out mortise cutting of the test material, measure the required electric power and noise, take records of each item specified in the Record Format 2 of Table 3 and, by the sense of touch, check for the existence or nonexistence of abnormal vibration and examine the conditions of cut surface.

In the measurement of the required electric power, carry out examination by changing the size of mortising chisel at a constant feed speed, or by changing the feed speed with a constant size of mortising chisel.

Table 3. Record Format 2

No.	Test material			Tools										Cutting condition				Required electric power				Description																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
	Dimensions			Species of tree or type of wood	Water content	Hollow chisel			Drill							Main spindle speed of rotation $\text{min}^{-1}$ (rpm)	Cutting speed $\frac{\text{m}}{\text{min}}$	Feed speed $\frac{\text{m}}{\text{min}}$	Depth of hole $\text{mm}$	Voltage $\text{V}$	Current $\text{A}$		Input		Cutting power $\frac{P_1}{P_0}$	Noise $\text{dB}$ (A)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	Length $\text{mm}$	Width $\text{mm}$	Thickness $\text{mm}$			Tooth shape	Material of cutting edge	Diameter $\text{mm}$	Length $\text{mm}$	Length of cutting part $\text{mm}$	Diameter of shank $\text{mm}$	Number of teeth	Tooth shape	Material of cutting edge	$P_0$ $\text{kW}$								$P_1$ $\text{kW}$																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

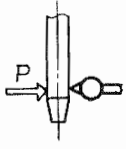
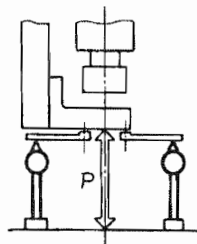
- Remarks 1. The cutting direction of the test material and measuring conditions of noise shall be recorded in the description column.
2. The shape of tool shall be illustrated with main dimensions.
3. For a manually operated machine, measurement of required electric power is not necessary.
4. The depth of hole shall be 30 mm or over.



#### 4. Methods for Rigidity Test

The rigidity tests for the hollow chisel mortising machines shall be as specified in Table 4.

Table 4. Rigidity Tests

No.	Inspection item	Measuring method	Diagram for measuring method
1	Flexural rigidity of main spindle system	Putting a test indicator to the tip end of the main spindle (1) (side surface), apply a load (P) horizontally from two opposite directions confronting the spindle (2), and measure the deflections of the main spindle. Carry out these measurements in the left and right and in the front and rear directions.	
2	Overall rigidity of hollow chisel fitting part and table	When a load (P) has been applied vertically to the table (3) between the hollow chisel fitting parts (4), measure the relative displacements between the hollow chisel fitting parts and the table upper surface, in the left and right and the front and rear directions.	

Notes (1) Rotate the main spindle, and carry out this measurement after the bearing temperatures have been stabilized.

(2) The position to which the load is to be applied shall be as near to the main spindle as possible, and its distance from the main spindle end shall be recorded.

(3) For the machine of which main spindle head or main spindle is designed to ascend and descend, measurement shall be fixed to the center of its motion.

(4) For the machine of which table is designed to ascend and descend, measurement shall be fixed to the center of its motion.

Remarks 1. The rigidity test of the machines of the same design may be represented by the test results of a typical one, omitting those for the others.

2. The load (P) of the magnitude recommended by the manufacturer shall be adopted for the test, and this load (P) shall be recorded.

#### 5. Methods for Static Accuracy Inspections

The static accuracy inspections for the hollow chisel mortising machine shall be in accordance with Table 5.

Table 5. Static Accuracy Inspections

Unit: mm

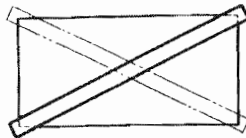
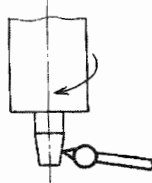
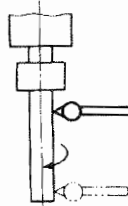
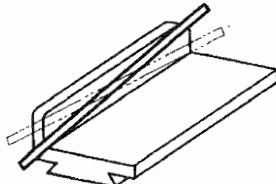
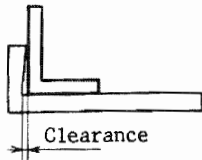
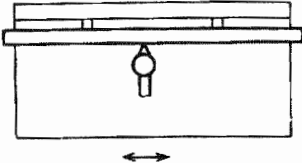
No.	Inspection item	Measuring method	Diagram for measuring method	Permissible value
1	Straightness of upper surface of table	Place a 500-mm straight-edge diagonally on the upper surface of the table <sup>(5)</sup> , measure the clearances with a feeler gauge, and take the maximum value as the measured value.		0.05 for each 500
2	Runout of main spindle	Applying a test indicator to the chuck fitting part of the main spindle, rotate the main spindle manually, and take the maximum difference of the readings of the test indicator during rotation as the measured value.		0.03
3	Runout of chuck	Insert a test bar in the chuck, apply a test indicator to its mouth and tip end, rotate the chuck manually, and take the maximum difference of the readings of the test indicator during rotation as the measured value.		0.12 at the mouth of test bar 0.14 at the position 100 from the mouth of test bar
4	Straightness of ruler surface	Place a straightedge diagonally on the ruler surface, measure the clearances with a feeler gauge, and take the maximum value as the measured value.		0.05 for each 500
5	Rectangularity of ruler surface with respect to upper surface of table	Stand a square on the upper surface of table, apply it to the ruler surface and measure to clearance with a feeler gauge, and take the maximum value as the measured value.		0.04 for each 100 The angle included by the ruler shall not be obtuse.
6	Parallelism of left and right motions of table with respect to ruler surface	Applying a test indicator to the square which has been applied to the ruler surface, allow the table to travel right and left, and take the maximum difference of readings of the test indicator as the measured value.		0.08 for each 300

Table 5. (Cont'd)

Unit: mm

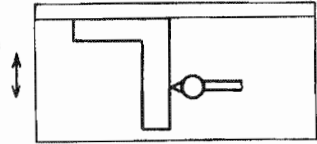
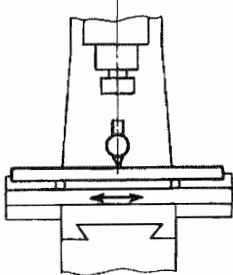
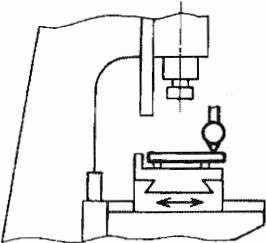
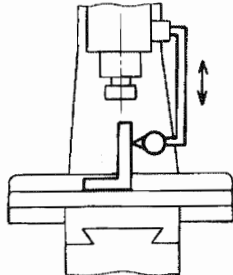
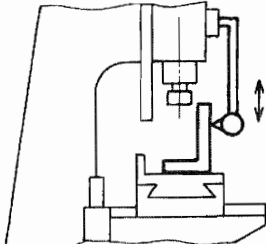
No.	Inspection item	Measuring method	Diagram for measuring method	Permissible value
7	Rectangularity of front and rear motions of table with respect to ruler surface	Place a square lying on the upper surface of the table, apply its one side to the ruler surface and apply a test indicator to the other side of the square, allow the table to travel back and forth, and take the maximum difference of readings of the test indicator as the measured value <sup>(6)</sup> .		0.04 for each 100
8	Parallelism of left and right motions of table with respect to its upper face	Applying a test indicator to a straightedge placed on the upper surface of the table, allow the table to travel right and left, and take the maximum difference of readings of the test indicator within the total traveling distance as the measured value <sup>(6)</sup> .		0.06 for each 300
9	Parallelism of front and rear motion of table with respect to its upper surface	Applying a test indicator to a straightedge placed on the upper surface of the table, allow the table to travel back and forth, and take the maximum difference of the readings of the test indicator within the total traveling distance as the measured value <sup>(6)</sup> .		0.04 for each 200
10	Rectangularity of upper surface of table with respect to vertical motion of main spindle	Stand a square on the upper surface of the table <sup>(7)</sup> , apply a test indicator which has been fixed on the main spindle head to this, allow the main spindle to travel vertically, and take the maximum difference of readings of the test indicator as the measured value <sup>(6)</sup> .		0.05 for each 100
				0.05 for each 100

Table 5. (Cont'd)

Unit: mm

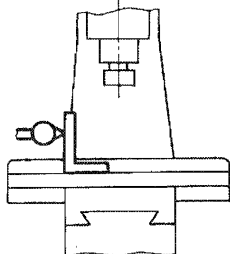
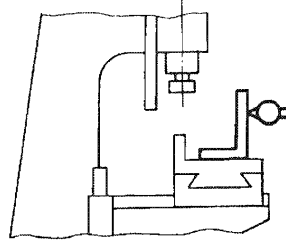
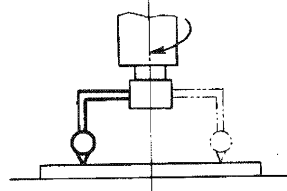
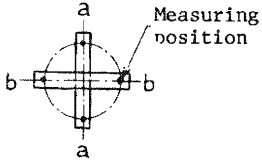
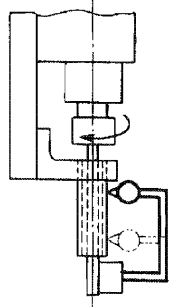
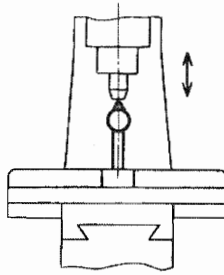
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
11	Rectangularity of upper face of table with respect to vertical motion of table	Stand a square on the upper surface of the table (?), apply a test indicator to this and allow the table to ascend from the lowermost position, and take the maximum difference of readings of the test indicator during ascent as the measured value (6).		0.05 for each 100
				0.05 for each 100
12	Rectangularity of center line of main spindle with respect to upper surface of table	Place a straightedge on the upper face of the table in the left and right and the front and rear directions, apply to it a test indicator which has been fixed to the main spindle and swing it by 180°, and take the maximum difference of readings of the test indicator as the measured value (6).		0.10 for each 300 in swinging diameter
				0.10 for each 300 in swinging diameter
13	Coaxiality of center line of main spindle with respect to hollow chisel fitting hole	Attach a test bar to the hollow chisel fitting hole, apply a test indicator which has been fixed to the main spindle to this and rotate the main spindle manually, and take 1/2 of the maximum difference of readings of the test indicator during rotation as the measured value.		0.05 at the mouth of test bar 0.08 at the position 100 from the mouth of test bar

Table 5. (Cont'd)

Unit: mm

No.	Inspection item	Measuring method	Diagram for measuring method	Permissible value
14	Movement of main spindle in axial direction	Fix a test indicator to the upper surface of the table, apply the end face of the main spindle to this and shake the main spindle in axial direction <sup>(6)</sup> , and take the maximum difference of readings of the test indicator as the measured value.		0.10

Notes <sup>(5)</sup> In the case where the measuring distance is smaller than the standard, the numerical value of the permissible deviation value of measurement shall be converted in proportion to the distance.

<sup>(6)</sup> In taking the readings, the knee shall be fastened firmly.

<sup>(7)</sup> The table shall be placed in the center of the left and right or front and rear of motion.

<sup>(8)</sup> The force shaking in the axial direction shall be approximately 150 N {approximately 15 kgf}.

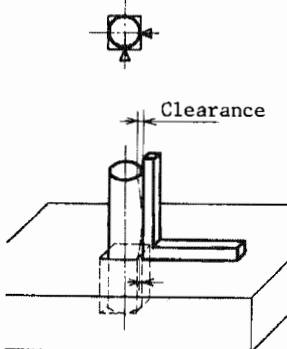
Remark: For a hollow chisel mortising machine not provided with functions concerned, the inspection items corresponding to those given in Table 5 are to be omitted.

## 6. Method for Machining Accuracy Inspection

The machining accuracy inspection for the hollow chisel mortising machine shall be as specified in Table 6.

Table 6. Machining Accuracy Inspection

Unit: mm

No.	Inspection item	Measuring method	Diagram for measuring method	Permissible value
1	Rectangularity of mortising hole	After a through hole has been processed with a 12-mm hollow chisel in a test material approximately 50 mm in thickness, insert a test bar in it, apply to the surface of the test bar a straightedge made to stand on the upper surface of the test material in the left and right and the backward and forward directions, measure the clearances with a feeler gauge, and take the maximum value as the measured value.		0.10 for each 50
				0.10 for each 50

Remark: The test material shall be preliminarily subjected to necessary pre-processing in advance.

Applicable Standards:

JIS B 0114-Glossary of Terms for Wood Working Machinery

JIS B 6507-General Code of Safety for Wood Working Machinery

JIS B 6521-Methods of Measurement for Noise Emitted by Wood Working Machinery

Reference Standards:

JIS B 6501-Test Code for Performance and Accuracy of Wood Working Machinery

JIS Z 8203-SI Units and the Use of their Multiples and of Certain other Units

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